

FROM BAGHDAD TO LONDON: UNRAVELING URBAN DEVELOPMENT IN EUROPE, THE MIDDLE EAST, AND NORTH AFRICA, 800–1800

Maarten Bosker, Eltjo Buringh, and Jan Luiten van Zanden*

Abstract—This paper empirically investigates why, between 800 and 1800, the urban center of gravity moved from the Islamic world to Europe. Using a large new city-specific data set covering Europe, the Middle East, and North Africa, we unravel the role of geography and institutions in determining long-run city development in the two regions. We find that the main reasons for the Islamic world's stagnation and Europe's long-term success are specific to each region: any significant positive interaction between cities in the two regions hampered by their different main religious orientation. Together, the long-term consequences of a different choice of main transport mode (camel versus ship) and the development of forms of local participative government in Europe that made cities less dependent on the state explain why Europe's urban development eventually outpaced that in the Islamic world.

The more numerous and the more abundant the population in a city, the more luxurious the life of its inhabitants.

Ibn Khaldûn (c. 1375)

I. Introduction

IN 800, only four decades after its founding, Baghdad had become a metropolis of more than 300,000 inhabitants. As the capital of the mighty Abbasid caliphate that stretched from present-day Algeria to Pakistan, it was the center of economic and political power in the Islamic world, unrivaled in its artistic, scientific, and cultural achievements. To this splendor, London stood in sharp contrast. In 800, it had no more than 10,000 inhabitants and was plagued by constant internal struggles among Anglo-Saxon tribes. Who could have thought that a thousand years later, the two cities' roles were to be completely reversed? Baghdad, following the demise of the Abbasid caliphate, had lost its prominent position in the Islamic world, becoming an unimportant town in the Ottoman Empire. London, in contrast, had become a thriving metropolis of almost 1 million inhabitants. As the capital of the British Empire, it was the economic and political center of the world, offering unprecedented prosperity to its inhabitants. As the English writer Samuel Johnson noted in 1777: "There is in London all that life can afford."

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* Bosker: Utrecht University, Erasmus University Rotterdam, CEPR, and Tinbergen Institute; Buringh: Utrecht University; van Zanden: Utrecht University.

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Baghdad and London exemplify the divergent development of Europe and the Islamic world.¹ In 800 the Islamic world was, in virtually all respects, more advanced than Europe. Following the rapid spread of Islam over the Middle East, North Africa, Spain, and Central Asia, the Islamic world enjoyed a period of unprecedented economic, scientific, and cultural development: the Islamic golden age (Hourani, 2002; Kennedy, 2007). At the time, Europe was a backwater in the world economy. After the demise of first the Roman and subsequently the Carolingian Empire, Europe underwent a period of economic stagnation, or perhaps even decline (see Pirenne, 1969; Davis, 1955). In the following centuries, however, development in the Islamic world stagnated, whereas Europe slowly but steadily closed the gap with the Islamic world and eventually overtook it in economic as well as scientific achievements (Lewis, 2002; Kuran, 2011; Greif, 2006; Hourani, 2002).

This paper focuses on this reversal of fortunes. Several hypotheses have been put forward that explain the rise of Europe and the stagnation of the Islamic world. But attempts to empirically back up these hypotheses are few. This is where the main contribution of our paper lies. By virtue of a newly collected data set covering a wide range of city-specific characteristics in both Europe and the Middle East and North Africa over the period 800 to 1800, we empirically identify some of the most important factors explaining the divergent long-term development of Europe and the Islamic world.²

¹ The spatial scope of our analysis is Europe and the Middle East and North Africa (see the map in figure 1). Whenever we refer to the Islamic world in this paper, we mean the Islamic cities within this spatial reach, including at times those on the Balkan, in Andalusia, and in southern Italy. Our analysis does not cover the Islamic cities south of the Sahara or those in Central and Southeast Asia.

² We focus on the 800–1800 period for the following reasons. We start in 800 because it is the first year for which comprehensive data on city population exist for Europe (Bairoch, Batou, & Chèvre, 1988). We extend these data to also cover the Middle East and North Africa for the same time period. Moreover, starting the analysis in 800 precludes us from having to consider the rapid spread of Islam during the early Islamic conquests. By 800, these had largely come to a halt (with the exception of southern Italy, which came under Muslim control from the mid-ninth century onward). We stop in 1800 because extending the sample period further would, in our view, require an in-depth account of the Industrial Revolution, which lies beyond the scope of our paper.

All recent empirical work on long-term trends in economic performance in the premodern era uses estimates of city population, the number of cities, or urbanization rates as the most reliably available proxy of economic success (DeLong & Shleifer, 1993; Acemoglu et al., 2005; Dittmar, 2011; Nunn & Qian, 2011; Cantoni, 2010; Cantoni & Yuchtman, 2010). In a premodern economy, the size of the urban population or the rate of urbanization reflects the ability of economies to produce an agricultural surplus, attract resources, and provide the infrastructure needed to feed, house, and employ those living in cities (Wrigley, 1985; de Vries, 1984; Hohenberg & Lees, 1995). Cities are also often in themselves more conducive places to economic success, for example, by offering economies of scale and scope, or agglomeration benefits (Glaeser, 2011; Fujita, Krugman & Venables, 1999).

More specifically, our contribution is twofold. First, our newly collected city population data for the Middle East and North Africa allow us to compare trends in urban development in the Islamic world to those in Europe. We show that these trends confirm the notion of Europe's rise and the Islamic world's stagnation in the centuries leading up to the Industrial Revolution. Second, we relate the different long-term urban development of Europe and the Islamic world to differences in the underlying characteristics of the cities in the two regions. Our analysis focuses in particular on the relevance of two of the most prominent explanations for the reversal of fortunes between Europe and the Islamic world proposed in the (economic) historical literature: geographical conditions and institutional developments. Moreover, we provide tentative evidence of the relevance of the alleged interdependence of developments in the two regions.

Our main findings show that Europe and the Islamic world constituted two largely separate urban systems, each with a different structure and long-term evolution and with little evidence of significant interaction across religious lines. As such, the main drivers of urban development are specific to each of the two regions. In both regions, geography and institutions played an important role in determining the character and evolution of urban development, but in very different ways. In particular, local participative institutions restricting the dominant role of the state that do develop in Europe but not in the Islamic world, in combination with the long-term consequences of their different choice of main transport mode (camel versus ship), were important drivers of their reversal of fortunes. Together, they are an important part of the explanation why the urban center of gravity shifted from the Islamic world to Europe, making London, instead of Baghdad, the largest, most important city in this part of the world.

II. Europe's Rise and the Islamic World's Stagnation: The Theoretical Debate

Many explanations for Europe's rise and the Islamic world's stagnation have been posited in the largely narrative, theoretical economic history literature (Pirenne, 1969; Landes, 1998; Greif, 2006; Kuran, 2011; Platteau, 2008; Rubin, 2011; Hourani, 2002). The most prominent ones either focus on the different geographical conditions in the two regions or stress the importance of their very different institutional development (or both). Moreover, the negative interdependence of the developments in the two regions is stressed.

A. Geography: Opportunities for Trade and Agriculture

The geographical conditions in the two regions are argued to have influenced their long-term prospects in two important ways. First and foremost, geography plays an important role in determining a city's ability to participate in profitable long-distance trade with other cities and its

immediate hinterland. Trade is widely viewed as one of the important drivers of economic prosperity in both the Islamic world and in Europe (Lopez, 1976; Greif, 2006; Findlay & O'Rourke, 2007). A favorable geographical location for trade constitutes a substantial stimulus for economic and urban development (see Fujita & Mori, 1996; Acemoglu, Johnson, & Robinson, 2005; Gallup, Sachs, & Mellinger, 2001). Europe's abundance of navigable rivers, favorable location for Atlantic trade, and many natural ports have all been stressed as important factors in its long-term economic development. However, Mediterranean trade also flourished in the Islamic world during the golden age of Islam when the Mediterranean, with the exception of the eastern parts controlled by Byzantium, could be considered a "Muslim lake." Also, the absence of navigable rivers, particularly in northern Africa, was more than compensated by the efficient caravan routes connecting Morocco, India, Sudan, Egypt, and western Africa by camel, "the ship of the desert."³ Moreover, due to its geographical position in between Europe, Asia, and Africa, the Islamic world not only had access to the products of three different continents, it also enjoyed a natural, and very profitable, position as middleman (Findlay & O'Rourke, 2007).

The other important role of geography is in determining agricultural potential. A more productive hinterland is generally able to sustain higher levels of urban population (see Nunn & Qian, 2011). Agricultural conditions in the Middle East and North Africa are usually believed to be much worse, posing stronger limits on urban expansion than in Europe.⁴ The relationship between urban expansion and agriculture is, however, debated. Although some preconditions for agricultural production have to be met, agricultural systems appear to be very flexible and able to generate substantial surpluses when urban demand is sufficiently high (Grantham, 1989, 1999; Hoffman, 1996; Hohenberg & Lees, 1995)⁵. Given this contested role of agricultural conditions, combined with the fact that the available information on agricultural conditions is all based on twentieth-century conditions, the main focus in this paper is on the first, transport-related, role of geography. We do explicitly incorpo-

³ The Nile and Euphrates and Tigris river systems offer abundant opportunities for river transport.

⁴ The desert-type conditions that come to mind when thinking of the Islamic world easily hide the fact that some of the most fertile regions are found in the Islamic world, especially in the river valleys of the Nile, Euphrates, and Tigris, but also in parts of Tunisia and Morocco. In Roman times, Egypt and Tunisia were major foodbaskets of the empire. Egypt remained the main supplier of grain to the Byzantine Empire until the Arab conquests (Teall, 1959).

⁵ Europe's agricultural "revolution," one of the alleged important drivers of its urban (and economic) expansion during the Middle Ages (Mokyr, 1990; Duby, 1974), may itself have been partly driven by increased urban demand. In this respect, Europe's agricultural revolution was not that unique from agricultural developments in the Islamic world (Watson, 1983; White, 1962). The main urban centers in the Islamic world were very innovative in the use of complex systems of water management for agriculture and in experimenting with new, more productive crops that enabled them to sustain larger urban populations (Wittfogel, 1957; Watson, 1974).

rate the difference in agricultural potential between cities into our analyses and refer readers to appendix A in the online supplement for a more in-depth discussion on this issue.⁶

B. Institutions

An important different line of literature stresses institutional developments in Europe and the Islamic world as the most important driver of their different long-term development (Cahen, 1970; Downing, 1992; North & Thomas, 1973; Rubin, 2011; Pamuk, 2004; Kuran, 2011). Kuran (2003, 2005) and Greif (2006), for example, argue that the Islamic world's relative stagnation has its roots in its inability to develop institutions favoring market exchange that were more or less independent from the state. Throughout the Islamic world, power was generally concentrated in the hands of a strong state, favoring the economic interests of a small group of elites—the ruler and its central bureaucracy. This made economic stability and development more dependent on the state; political instability or a faltering state (due to internal instability or external threats, for example) easily translated into stagnating, or even declining, economic activity.

Similarly, proponents of this institutional view find the roots of Europe's rise in the specific institutions, emerging from the late Middle Ages onward, by which cities managed to constrain the power of the state (Weber 1922, 1958; North, 1981; Bisson, 2009; Greif, 2006). In Europe, which was politically highly fragmented following the demise of the Carolingian empire, cities start to develop forms of local participative government and demand representation in national policy-making. This process, which started around 1200 in cities in Spain, Italy, and Flanders, spread over Europe in the following centuries (van Zanden, Buringh, & Boskers, 2012) and is widely viewed as a strong stimulus for economic development (DeLong & Shleifer, 1993; Acemoglu et al., 2005).

C. Interdependence of the Developments in Europe and the Islamic World

These two explanations for the divergent development of Europe and the Islamic world are both specific to each region. As such, they treat the developments in the two regions as largely separate processes. Many authors, however, argue that the rise of Europe and the stagnation of the Islamic world were intertwined. In particular, these authors mostly see a negative correlation between developments in Europe and the Islamic world, arising to a very large extent from the religious divide between the two regions (Glick, 1979; Greif, 2006; Lewis, 1982, 2002).

Proponents of this view partly attribute Europe's decline following the fall of the Roman Empire to the rise of the

Islamic world. The rise of Islam that resulted in Muslim dominance of the Mediterranean and the trade routes to Asia disrupted Europe's trade with the outside world that since Roman times had been heavily focused toward the Mediterranean (Pirenne, 1969; Bairoch, 1988; see McCormick, 2001, for a critical discussion). It also made Christian cities along the Mediterranean seaboard and in the border areas between the two religions vulnerable to attacks and slave raids by Muslim pirates (Pirenne, 1969; Ambrus & Chaney, 2010), even resulting in the Christian loss of, most notably, Spain and Sicily, two economically important regions (Hourani, 2002).

Similarly, Europe's overseas expansion following the great discoveries of the fifteenth and sixteenth centuries is often viewed as one of the main drivers behind the relative decline of the Islamic world. The European discovery of the direct route to India and China made the Arab middleman obsolete. It sidetracked the main caravan routes, causing the Islamic world to lose what had been a lucrative trade in, notably, spices, silk, and gold. Europe, however, profited strongly from the discovery of the direct route to Asia's markets (Steengaard, 1974). It provided direct access to previously unaffordable luxuries, boosting trade (with the East and, indirectly, within Europe). Also, the discovery of the New World resulted in a huge influx of wealth and provided Europe with vast amounts of new lands that were soon colonized and turned into productive use (Findlay & O'Rourke, 2007; Pomeranz, 2000).

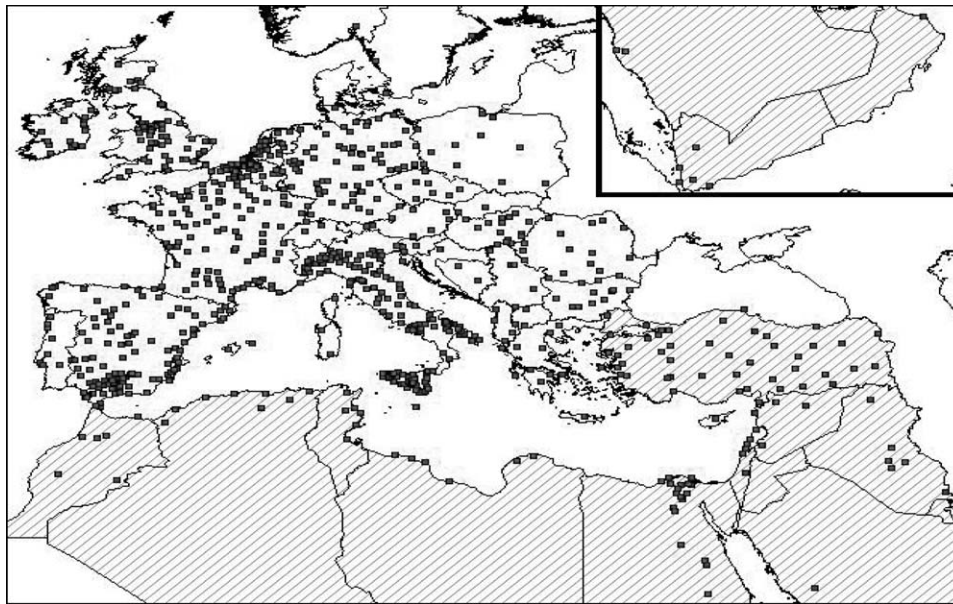
D. Many Theories, Little Empirical Evidence

With the notable exception of studies by Greif (1993, 1994), Karaman and Pamuk (2010), Ozmuur and Pamuk (2002), and Blaydes and Chaney (2011), little empirical evidence is available to back up these theories regarding the divergent development of Europe and the Islamic world.⁷ This is exactly where the contribution of our paper lies. In the next section, we present a large, newly collected, city-specific data set covering the cities in Europe, the Middle East, and North Africa over the period 800 to 1800. In section IVA, we use this data to quantify the long-term urban developments in Europe and the Islamic world. This confirms their reversal of fortunes. Next, in sections IVB to IVD, we relate urban development in the two regions to detailed information on various geographical, institutional, and religious characteristics of individual cities. This sheds new empirical light on the relative importance of the competing explanations for the very different long-term urban development patterns in Europe and the Islamic world.

⁷ The focus of most of these papers is different from the broad-based comparative perspective in this paper. They tend to look at development in a specific country, region, or city in a particular period. As examples, Greif (1993, 1994) looks at the Geniza and Genoese archives, Pamuk and his coauthors focus mostly on the Ottoman Empire, and Ambrus and Chaney (2010) consider the Barbary corsairs in North Africa.

⁶ On the basis of our results, we find it unlikely that the difference in agricultural potential between the two regions can explain their divergent long-run urban development.

FIGURE 1.—ALL CITIES IN OUR SAMPLE



Each dot represents a city that in at least one century during the period 800 to 1800 had 10,000 inhabitants or more. Shaded countries are included in our definition of the Middle East and North Africa. Nonshaded countries are included in our geographical definition of Europe. The black-bordered box in the upper-right corner shows the included cities on the Arab peninsula south of Medina.

III. Data set of Cities in Europe, the Middle East, and North Africa, 800–1800 AD

In this section we provide a brief overview of the main city-specific variables that form the basis of our empirical analyses. In our data appendix we provide a more detailed discussion of our data set. Table A1 in appendix A gives descriptive statistics for all of our variables.

A. City Population

Our main source for the population size of European cities is Bairoch et al. (1988), who provide population estimates for 677 European cities having more than 10,000 inhabitants in at least one of the centuries during our sample period.⁸ For the Middle East and North Africa, no comprehensive data have existed on the size of cities in the preindustrial age. We fill this gap and have systematically collected information on the size of all 116 cities ever larger than 10,000 inhabitants in the Middle East and North Africa on the same centennial basis as Bairoch et al. (1988). Figure 1 maps all the cities in our sample.

B. City-Specific Geographical, Institutional, and Religious Characteristics

In addition to city population, we have collected new city-specific information on various geographical, institutional, and religious characteristics.

⁸ Following de Vries (1984) and Acemoglu et al. (2005), we focus on cities larger than 10,000 inhabitants only. Because of the gradually increasing (urban) population, the number of cities increased from 61 in 800 to 667 cities in 1800 (from 32 to 595 in Europe and from 29 to 72 in the Middle East and North Africa).

Geography: Opportunities for Trade and Agriculture. Our geographical characteristics concern a city's opportunities for long-distance trade and the agricultural potential of its immediate hinterland.

We capture a city's potential for water-based trade by documenting whether it is located at sea or on a navigable waterway. In case of land-based transportation, we document whether a city was located on a former Roman road or a hub of Roman roads (at least two Roman roads meeting) and whether it was located on one of the main caravan routes or a hub of caravan routes (at least two caravan routes meeting). We choose Roman roads and caravan routes for the following reasons. An advantage of using Roman roads is their uniformity across an Europe and the Islamic world. Both were part of the Roman Empire. Roman roads, constructed using similar methods and adhering to uniform quality standards, can be found throughout both regions.⁹ Additionally, using Roman roads avoids some of the reverse-causality issues that could arise when using actual roads (those being built to the larger urban centers instead of roads favoring subsequent urban expansion). Using caravan routes takes account of the fact that in the Islamic world, trade on camelback quickly became the main mode of long-distance transport following the Arab conquests (Hourani, 2002; Rostovtzeff, 1971). In contrast to Europe, it largely replaced wheeled transportation (Bulliet, 1975). Concerns regarding the endogeneity of these caravan

⁹ Especially in Europe, the system of Roman roads is argued to have played an important role in trade long after the withering of the empire itself. Glick (1979) gives several examples of policies by medieval Spanish states and cities to maintain the system of Roman roads. See also Bairoch (1988) or Lopez (1956) for a much more critical account on the long-run importance of the Roman road system in Europe.

routes are also limited. Their actual location remained more or less unchanged as the number of potential routes was limited by the availability of water in the form of oases, wells, or underground rivers.¹⁰

To capture the agricultural potential of a city's immediate hinterland, we use two different indicators.¹¹ The first is a set of six dummy variables indicating the maximum potential land productivity of its surrounding countryside. These dummy variables draw on Buringh, van Heest, and Staring (1975) who classify the world's landmass into six categories based on their maximum agricultural potential. Figure A1 in the data appendix shows the geographical distribution of these categories in both Europe and the Islamic world. Second, we use the geographically more detailed data from Ramankutty et al. (2002). That study combines information on climatic conditions and soil quality into one index indicating the probability that a certain location will be cultivated. These data are available in gridded form at a resolution of 0.5 degrees latitude-longitude (in the case of our sample, this corresponds to a grid of on average 55 by 39 kilometers). We match each city to these data on the basis of its coordinates. Cities within the same grid cell are assigned the same cultivation probability.

Finally, apart from these variables, we also know each city's elevation above sea level, as well as the ruggedness of the terrain surrounding each city, measured by the standard deviation of the elevation of the terrain within a 10-kilometer radius of the city).

Institutions. Our first three institutional variables document a city's status in the political and ecclesiastical hierarchy. They indicate whether a city is a capital city (based on McEvedy, 1977a, 1977b) or a bishopric or an archbishopric (based on Jedin, Latourette, & Martin, 1980) in each of the centuries in our sample, respectively. Being important seats of power, these cities tended to attract people and economic activity on the basis of the presence of the sovereign or (arch)bishop and his or her court, providing services—administration, protection—in return for taxes and land rent.¹² Commercial activity did of course take place, but this function was to a large extent secondary, derived only from its political or ecclesiastical role, and often was unable to provide the city with an economic basis of its own that justified its size. Note that Europe and the Islamic world share a common Christian heritage, so archbishoprics are

found throughout both regions. The nature of the Islamic faith, lacking a centralized hierarchy like that of the Church, does not readily lend itself to a classification of Islamic cities according to the worldly power derived from their place in the religious hierarchy.

To capture a city's religious importance in Islam or in Christianity, we constructed two dummy variables that indicate four of the most holy cities in our sample for each of the two religions, respectively: Mecca, Medina, Jerusalem, and Damascus in case of Islam and Jerusalem, Rome, Constantinople, and Santiago de Compostela in case of Christianity.¹³

Next, to capture a city's educational institutions, we established whether it was home to a university and, for the Islamic cities in our sample, whether it housed a madrasa.¹⁴ In Europe, universities started to appear from about the twelfth century onward, and soon they were found in cities throughout the continent. As centers of learning and scientific progress, attracting students and academics alike, their impact on economic development is viewed as important (see Cantoni & Yuchtman, 2010). The same could be argued for madrasas, the important centers of learning in the Islamic world. The earliest madrasa was the Al-Qarawiyyin in Fez, established in 859. From then on, madrasas started to appear all over the Islamic world. Most of them were primarily religious schools, also teaching nonreligious subjects. However, their connection to Islam was always present, making them substantially different from the eventually much more secular universities in Europe (see Makdisi, 1970, or Huff, 2003, for a good overview). In light of this, we classified only the three most important madrasas in the Islamic world—Al-Qarawiyyin in Fez, Al-Azhar in Cairo, and Al-Nizamiyya in Baghdad—as having a similar status as universities in Europe (we also code these three cities as having a university in the Islamic world).¹⁵

Finally, we constructed two different variables that, each differently, capture the institutional developments in Europe that have been claimed to be the important drivers of Europe's long-term success (Greif, 2006; DeLong & Shleifer, 1993; Acemoglu et al., 2005). The first indicates whether a city had a degree of local participative government, that is, the presence of a local urban participative

¹⁰ Libya's desert was, for example, impassable due to the lack of oases and fierce sandstorms (Lewicki, 1994).

¹¹ An advantage of both our variables is that they explicitly focus on agricultural potential on the basis of, for example, soil quality, or climatic conditions, instead of looking at actual production (which is arguably more endogenous).

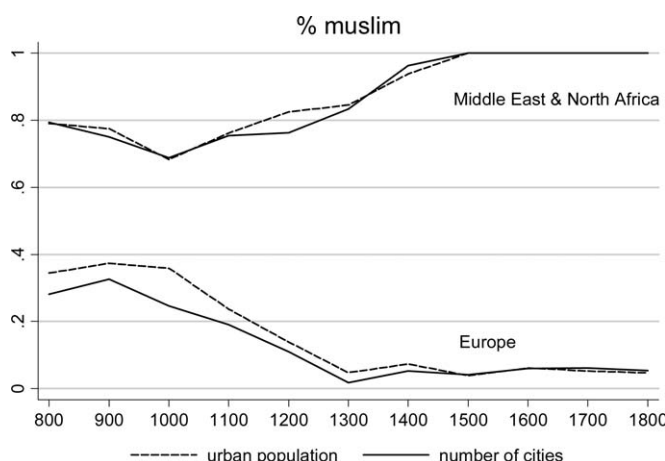
¹² Many examples exist of relatively small cities, such as Turin, Madrid, Damascus, Fez, Cairo, Copenhagen, Bern, Moscow, and Avignon, that experienced strong urban growth only following their designation as a capital city or as an important religious center. Also, cities losing their capital or (arch)bishop status often withered (Bairoch, 1988; Hohenberg & Lees, 1995; Bosker et al., 2008).

¹³ Note that we do not claim that these cities are of equal importance in Islam or Christianity respectively.

¹⁴ We decided not to use the actual number of madrasas reported in the sources of each city for two reasons. First, madrasas differ substantially in terms of size, ranging from a small school in a mosque to the very large Islamic universities such as Al-Azhar or Al-Qarawiyyin. As such, it is difficult to know what the actual number means (often different sources even mention different numbers of madrasas). We think that using a simple dummy variable is a cautious way of using the available madrasa information. Second, madrasas were virtually always related to mosques so that, similar to using the number of churches, using their actual number raises more severe issues with reverse causality (an expanding population results in more mosques and thus more madrasas); for example in 1800, Istanbul had 94 madrasas compared to 1 madrasa in Sey, Kastamonu, or 5 in Konya.

¹⁵ UNESCO refers to the madrasa in Fez as the “oldest university in the world” (see <http://whc.unesco.org/en/list/170>).

FIGURE 2.—PERCENTAGE OF MUSLIM CITIES AND URBAN POPULATION IN EUROPE AND THE MIDDLE EAST AND NORTH AFRICA, 800–1800



Urban population is defined as the number of people in cities with at least 10,000 inhabitants.

organization that decides on local urban affairs. The other concerns the larger political entity a city is embedded in. We document whether a city belonged to a political entity where cities could participate in the political process by having representatives in an active parliament. This variable is based on van Zanden et al. (2012), who document the rise (and fall) of parliaments in Europe from 1188 onward. Interestingly, these processes (cities with a form of local participative government or gaining influence in national policymaking) never took place in the Islamic world (Cahen, 1970). There, political power remained firmly concentrated in the hands of the sovereign and his central bureaucracy (Pamuk, 2004, 2008; Landes, 1998; Hourani, 2002).¹⁶

To also, however roughly, capture institutional developments in the Islamic world, we document whether a city belongs to a large state.¹⁷ This variable, based on Nüssli (2003), serves as a rough proxy to verify whether the extent of empire mattered for city development and, if so, how. On the one hand, to the extent that rulers of larger states tended to be more powerful and have more resources at their disposal, this serves as a proxy for these rulers' possibilities to control migration and constrain city development, especially at the periphery. On the other, more positive hand, belonging to a larger state also gave a city access to a larger internal market, and it could benefit from the state's better ability to maintain law and order, safeguard trade routes, and organize defenses against outside invaders (Hohenberg & Lees, 1995).

Cities' Interaction across and within Religious Lines. Finally, we verify the existence of any positive or negative interaction between cities in the two regions. In doing so,

¹⁶ Cities in the Ottoman Empire were governed in a decentralized way, yet the main urban official (the *kadi*) was always appointed by the sultan.

¹⁷ Large refers to the size of the territory controlled. See the data appendix for a list of all the polities that we consider to be large states.

we take the religious divide between Europe and the Islamic world as our starting point. Until the eighth century, Christianity was the dominant religion in both regions. This changed drastically with the Arab conquests when the Arabs established a vast Islamic empire in only a few decades time (Kennedy, 2007). The resulting religious divide is blamed for creating a significant barrier for interaction between Europe and the Islamic world (Pirenne, 1969; Glick, 1979; Greif, 2006) either directly by causing misunderstanding and violence or indirectly by driving institutional, legal, cultural, or political differences between the two regions.

We combine information on each city's own religious orientation (Jedin et al., 1980) with that on their relative location to other cities of the same or a different religious orientation and construct two measures that capture the extent of Muslim or Christian urban development in its vicinity, respectively.¹⁸ Based on the definition of urban potential in de Vries (1984), we define city i 's **Muslim or Christian urban potential** as the distance-weighted sum of the size of all other Muslim or Christian cities, respectively:¹⁹

$$UP_{ijt}^{mus} = \sum_{j \neq i}^n \left[\frac{pop_{jt}}{D_{ij}} I_{jt}^{mus} \right], \text{ and } UP_{ijt}^{chr} = \sum_{j \neq i}^n \left[\frac{pop_{jt}}{D_{ij}} I_{jt}^{chr} \right], \quad (1)$$

where pop_{jt} is the population of city j at time t , D_{ij} is the great circle distance between city i and city j calculated using their respective coordinates, and I_{jt}^{chr} and I_{jt}^{mus} are dummy variables indicating whether city j 's main religious orientation at time t is Christian or Muslim, respectively.

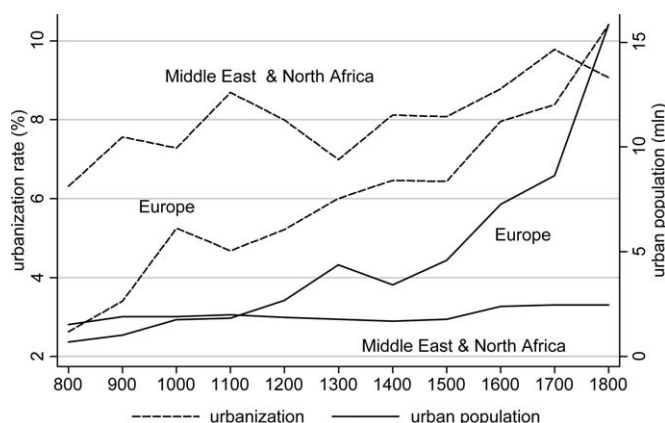
Our urban potential measures, equation (1), take explicit account of the shifting boundaries between Islam and Christianity during our sample period. Especially on the Iberian peninsula, southern Italy, the Balkans, Turkey, and during the Crusades, cities shifted from Muslim to Christian hands or vice versa. Figure 2 illustrates this by showing the percentage of cities, and of urban population, that is Muslim in Europe and in the Middle East and North Africa. Only from about the fifteenth century onward do these geographical boundaries also largely coincide with the boundary between Islam and Christianity.

Besides these two urban potential variables, we also collected a variable that more directly measures the effect of one particular outside influence on city development: that of war and invasion (Iyigun, 2008; Fletcher & Iyigun,

¹⁸ Besides these two urban potential variables, we also construct several other variables that measure the vicinity and size of nearby cities in a different manner, for example, the distance to the nearest Muslim or Christian city, or (dummy) variables indicating the presence, number, or size of Muslim or Christian cities within certain specified distance bands from each city (see table A5 in appendix A and our discussion in section IVB).

¹⁹ This measure also closely resembles measures of market access or market potential used in the (empirical) economic geography literature to establish the importance of preferential location with respect to other (large) markets (Amiti & Cameron, 2007; Hanson, 2005).

FIGURE 3.—URBAN DEVELOPMENT IN EUROPE AND THE MIDDLE EAST AND NORTH AFRICA



Urban population is defined as the number of people living in cities larger than 10,000 inhabitants. Total population for the different countries for the eleven time periods of our analysis, needed to calculate urbanization ratios, are from McEvedy and Jones (1979). For countries included in our definition of Europe and the Middle East & North Africa, see figure 1. The urbanization rate is calculated as total urban population in each region divided by total population in each region ($\times 100$).

2010). For each city, we record the number of times it was plundered in each preceding century. It captures, among others, the Mongol invasions that were particularly devastating in the Islamic world (in the thirteenth century, 18% of our cities in the Islamic world were plundered compared to an average 4.8% during the rest of our sample period), as well as the Viking raids that plagued large parts of northern and western Europe (in the ninth century, 8% of our cities in Europe were plundered compared to an average 2.5% during the rest of our sample period).

IV. Unraveling the Main Drivers of Urban Development in Europe and the Islamic World

A. Reversal of Fortunes: Trends in Urbanization and the Largest Urban Centers

We start our empirical analysis by briefly describing the difference in urban development in Europe and the Middle East and North Africa. Figure 3 shows the evolution of each region's urban population and urbanization rate over our sample period. It confirms the shift in the urban center of gravity from the Islamic world to Europe.²⁰ In 800, urban

²⁰ In figure 3, we use our geographical definition of Europe and the Middle East and North Africa (see figure 1). The reason for this is that total population numbers are not available by religion. The total population numbers we use (McEvedy & Jones, 1979) are available at the present-day country level, enabling us to compare urbanization rates based on a geographical definition of the two regions. Note, however, that the religious and geographical boundaries of the two regions largely overlap from about 1400 (see figure 2). Before that, our geographical boundaries "wrongly assign" Byzantine cities to the Islamic world and the Muslim cities on the Iberian peninsula and Sicily to Europe. Given that city population in these two groups of cities is roughly similar and our overall population numbers for Spain are slightly lower than Turkey's, the pattern of Europe's rise and the Islamic world's stagnation shown in figure 3 would only become more pronounced when using a definition of the two regions along religious lines.

population in Europe was about 0.7 million, less than half that in the Middle East and North Africa (1.5 million). In the next millennium however, Europe's urban population increased more than twentyfold to almost 16 million, whereas it less than doubled in the Middle East and North Africa (see also Ashtor, 1976).

The evolution of the two regions' urbanization rates shows a quite similar pattern. In 800 the urbanization rate in the Middle East and North Africa of around 6% was nearly three times that in Europe. Over the next millennium, Europe's urbanization rate steadily rose, whereas that in the Islamic world showed a more or less stagnating pattern, so that in 1800, Europe had also overtaken the Islamic world in its degree of urbanization.

Finally, Europe's rise also showed in the geographical distribution of the largest cities (see table A2 in appendix A). Until 1200 virtually all of the largest cities were located in the Islamic world: Baghdad, Damascus, Cairo, and Córdoba. This started to change around 1300 with the rise of Paris, Venice, and Naples, and from 1600 onward, three of the five largest cities were European. In 1800, London had become the largest city in this part of the world.

B. Unraveling the City-Specific Drivers of Urban Development

As our first step toward uncovering the important city-specific drivers of this very different long-term urban development in Europe and the Islamic world, we estimated the following simple linear regression model (see also Acemoglu et al., 2005, or Dittmar, 2011):

$$\ln pop_{it} = X_i\beta + X_{it}\gamma + \alpha_i + \alpha_t + \varepsilon_{it}, \quad (2)$$

where pop_{it} is the population of city i at period t , X_i are time-invariant city-specific variables, X_{it} are time-varying city-specific variables, α_i denotes a city-specific effect, and α_t are century-specific fixed effects. Finally, ε_{it} is a disturbance term that we allow to exhibit both arbitrary serial dependence and heteroskedasticity (we cluster our standard errors at the individual city level). The estimated coefficients on the included city-specific variables, β and γ , are our main point of interest. In this section, we restrict the α_i to be uncorrelated with the other regressors (we use a random-effects specification), given that not doing so would leave us unable to say much about the time-invariant, mostly geography-related, city-specific variables in our regressions. In sections IVC and IVD, we present only results using a fixed-effect specification that does not make this assumption. Moreover, table A4 in the appendix shows that all the results on our time-varying regressors presented in this section hold up to using such a fixed-effects specification.

Besides estimating equation (2) considering all cities in the sample, we distinguish two main subsamples by which we verify possible differences in the main determinants of

urban development in Europe and the Islamic world, respectively.²¹ These subsamples are based on a division of the sample in cities belonging to the Christian or Islamic sphere of influence, respectively, that is, on the actual (changing) religious boundaries between the two regions. Using geographically fixed boundaries has the disadvantage of classifying many cities as European (for example, Córdoba, Palermo, Seville) or as part of the Islamic world (for example, Constantinople, Antioch, or Jerusalem) that, based on their religious orientation, would, sometimes for many centuries, fall much more under the Islamic or European sphere of influence, respectively. Only from the fifteenth century onward do the religious boundaries largely correspond to our geographical definition of Europe and the Middle East and North Africa (see figure 2).

Table 1 shows the results of estimating equation (2). We first discuss the results on the importance of geographical conditions and institutional developments in explaining urban development in Europe and the Islamic world. Our discussion focuses on the first three columns of table 1. Columns 4 to 7 mainly serve as robustness checks that we discuss subsequently when considering the evidence for any interdependence of urban developments in the two regions.

Geography: Opportunities for Trade. In both Europe and the Islamic world, cities had a clear advantage of being well positioned on the main transport corridors. However, the nature of these main transport corridors differed markedly between the two regions.²²

In Europe, having good access to navigable water (that is, direct access to the sea) spurred urban development. European trade very much focused on water transport. The Byzantines and then the Italians dominated Mediterranean trade, in northern Europe trade was dominated by the Hanseatic cities on the shores of the Baltic and the North Sea, and after 1500, the Atlantic ports prospered following the great discoveries (Acemoglu et al., 2005). For cities in the

Islamic world, this was not the case: although a slightly higher percentage of cities in the Islamic world are located on the (see table A1 in appendix A), these cities generally did not fare better than their landlocked counterparts (see also Ashtor, 1976).²³ Indeed, the really big Muslim cities—Baghdad, Damascus, Fez, Marrakech, Cairo, and Córdoba—are all inland (Istanbul is a notable exception, but it became a Muslim city only in 1453). Mediterranean trade was small compared to the Muslim trade across the Sahara and in the Indian Ocean (Pryor, 1988; Steengaard, 1974).

It may therefore not be surprising that we find that land-based transportation, and in particular transport on camel-back, was more important in the Islamic world. Cities with good access to the caravan route network, and hubs in particular, were significantly larger than cities not connected to this network. It indicates the importance of the caravan trade that largely replaced wheeled transportation following the Arab conquests (Bulliet, 1975; see also the negative effect of location on a former Roman road). It is also a reflection of the main orientation of the Islamic world toward the East and South (Pryor, 1988).

In Europe we find no significant effect of an advantageous location for land-based transportation. Cities located on a hub of former Roman roads had a significantly larger population, but this effect was not very robust (see column 5; or see table A6, column 3).²⁴ Also, the Christian cities in Anatolia, Syria, and Lebanon, which in principle could be well connected to the caravan network (and were so following their Muslim conquest), were not significantly benefiting from this: we find a significantly negative effect of being located along one of the caravan routes.²⁵ Indeed, trade in the Byzantine Empire, by virtue of its dominance in eastern Mediterranean waters, was much more focused toward the sea (Avramea, 2002).

Institutions. The results in table 1 confirm the important role of the state in urban development. Being a capital city had a big positive impact on a city's size in both Europe and the Islamic world. Capital cities attracted people and capital alike as public expenditure or royal privileges were biased toward these cities, creating jobs and business opportunities. As Ades and Glaeser (1995) put it "Urban giants

²¹ We are aware that our results may suffer from endogenous sample selection bias given that we are considering only cities larger than 10,000 inhabitants. Such bias would arise if we have missed important factors related to both selection and city size conditional on selection (see Heckman, 1979). In this respect, it is reassuring that all our results also come through when using the available (less reliable) information on cities larger than 5,000 inhabitants (see table A6 in the appendix). We also experimented with a Heckman selection model using Europe's and the Islamic world's common Roman heritage to satisfy the necessary exclusion restrictions, but results (insignificant Mills' ratio or insignificance of our Roman heritage variables in the selection stage) were unsatisfactory. They are available on request. Acemoglu, Johnson, and Robinson (2002, 2005) address the selection problem by looking only at cities that are larger than 10,000 inhabitants throughout their sample period. In our case, this results in a sample of only 37 of our 793 cities. In our view, the selection bias may be just as large, or even larger, when using such a balanced sample due to the even stricter inclusion criterion. Note also that Acemoglu et al. (2005, p. 558) remark that in their case, sample composition bias did "in practice . . . not seem to be important."

²² We focus on the role of geography in determining opportunities for trade. In section A.2 of appendix A, we discuss the results regarding the other role of geography, defining agricultural potential, in more detail.

²³ Note that the significant sea effect when focusing on the Muslim cities in the Middle East and North Africa only (column 6 of table 1) appears to suggest otherwise. This result is, however, entirely driven by one city only: Damietta (see the additional remarks to table 1 for more on this).

²⁴ See Lopez (1956) on the waning importance of the Roman road network during the Middle Ages.

²⁵ On the European continent, the camel never gained importance in overland trade. The main reason for this is the camel's physiology. A camel is perfectly suitable for desert life (it can withstand extreme heat and desiccation and its feet form cushions spreading its weight on the sand), but it is generally incapable of surviving in swampy or permanently wet areas and its cushioned feet are a disadvantage in mountainous areas (Wilson, 1984). As a result, even in Muslim Spain, "camels stood no chance of becoming established in the region on a large scale" (Bulliet, 1975, p. 229–230).

TABLE 1.—BASELINE RESULTS

| Sample: | All Cities | Muslim | Christian | Middle East and North Africa | Europe | Middle East and North Africa Muslim | Europe Christian |
|------------------------|-------------------|-------------------|--------------------|------------------------------|--------------------|-------------------------------------|-------------------|
| Sea | 0.25*** [0.00] | 0.24 [0.11] | 0.25*** [0.00] | 0.42*** [0.01] | 0.26*** [0.00] | 0.38** [0.04] | 0.25*** [0.00] |
| River | 0.09** [0.04] | 0.12 [0.23] | 0.05 [0.31] | 0.21* [0.07] | 0.06 [0.25] | 0.11 [0.42] | 0.05 [0.3] |
| Roman road | 0.03 [0.59] | −0.09 [0.55] | 0.06 [0.22] | 0.08 [0.71] | 0.03 [0.61] | 0.05 [0.84] | 0.05 [0.28] |
| Hub Roman road | 0.09* [0.10] | 0.08 [0.54] | 0.10** [0.04] | 0.12 [0.55] | 0.08 [0.13] | 0.12 [0.57] | 0.10** [0.05] |
| Caravan | 0.08 [0.46] | 0.31* [0.05] | −0.34*** [0.00] | 0.06 [0.66] | — [0.00] | 0.25 [0.15] | — [0.10**] |
| Caravan hub | 0.5*** [0.00] | 0.78*** [0.00] | 0.09 [0.61] | 0.55*** [0.00] | — [0.00] | 0.70*** [0.00] | — [0.00] |
| Bishop | 0.18*** [0.00] | 0.22** [0.04] | 0.19*** [0.00] | 0.37*** [0.00] | 0.17*** [0.00] | 0.27* [0.06] | 0.19*** [0.00] |
| Archbishop | 0.34*** [0.00] | 0.12 [0.45] | 0.41*** [0.00] | 0.35 [0.16] | 0.39*** [0.00] | 0.22 [0.36] | 0.41*** [0.00] |
| Holy City, Christian | 0.26 [0.26] | — [0.12] | 0.47 [0.12] | 0.29 [0.57] | 0.22 [0.54] | — [0.54] | 0.34 [0.34] |
| Holy City, Muslim | 0.19 [0.24] | −0.08 [0.79] | — [0.93] | 0.02 [0.93] | — [0.93] | −0.18 [0.62] | — [0.62] |
| Capital | 0.87*** [0.00] | 0.67*** [0.00] | 0.93*** [0.00] | 0.73*** [0.00] | 0.91*** [0.00] | 0.72*** [0.00] | 0.95*** [0.00] |
| University | 0.32*** [0.00] | 0.09 [0.83] | 0.30*** [0.00] | 0.11 [0.75] | 0.29*** [0.00] | 0.16 [0.74] | 0.30*** [0.00] |
| Madrasa | 0.25** [0.01] | 0.12 [0.25] | — [0.11] | 0.19 [0.11] | 0.12 [0.48] | 0.16 [0.19] | — [0.19] |
| Plundered | 0.03 [0.56] | 0.02 [0.57] | −0.09 [0.14] | 0.07 [0.103] | −0.16*** [0.01] | 0.03 [0.41] | −0.14** [0.03] |
| In UP, Muslim | 0.08 [0.31] | 0.30** [0.04] | 0.03 [0.72] | 0.24 [0.12] | 0.19** [0.04] | 0.29* [0.10] | 0.07 [0.47] |
| In UP, Christian | 0.23*** [0.00] | 0.29 [0.12] | 0.25*** [0.00] | −0.02 [0.9] | 0.21*** [0.00] | 0.18 [0.43] | 0.25*** [0.00] |
| R^2 | 0.46 | 0.52 | 0.43 | 0.60 | 0.40 | 0.56 | 0.41 |
| Number of observations | 2596 | 656 | 1940 | 570 | 2026 | 499 | 1869 |

The dependent variable in all columns is $\ln(\text{city population})$. p -values, based on standard errors that are clustered at the individual city level, are in brackets. significant at *10%, **5%, ***1%, respectively. Results obtained allowing for city-specific random effects. Regressions include as additional control variables: a Muslim dummy (in case of the total, Middle East and North Africa, and Europe samples), In distance to Mecca, In distance to Byzantium, In distance to Rome (in the Muslim and Christian samples, we include only In distance only to Mecca and to Byzantium and Rome, respectively), In elevation above sea level, In ruggedness of the surrounding area (10 km), and cultivation potential; they also include a full set of ecozone-, country- and century-fixed effects. Results for these variables are shown in table A3 in the Appendix. See figure 1 for the definition of Europe and of the Middle East and North Africa.

In columns 2 and 6 we also estimate a significant positive effect of Christian holy cities, and in column 3 a significant negative effect of Muslim holy cities. We are reluctant to make much of these findings. They are basically a Constantinople effect in the Muslim sample and a Jerusalem effect in the Christian sample. Similarly, in columns 3 and 7, the madrasa variable does not drop out and shows a significantly positive effect. This is solely a Granada-1500 effect, the only city in the Christian sample, besides Jerusalem, that we classify as having a madrasa; Granada was conquered by Christian forces in 1492. Finally, note that columns 4 and 6 suggest a significantly positive effect of location at sea in the Muslim cities in the Middle East and North Africa. These findings are entirely driven by Damietta, which is why we do not dwell on them in any detail. Leaving out Damietta turns the sea effect insignificant. Damietta has a very particular history. It is the only Muslim city in our sample that lost access to the sea. Its strategic location at the eastern mouth of the Nile made it the focus of attack of both the Fifth and Seventh Crusades. Both times Christian forces took the city but did not hold it for long. After recapturing the city for a second time, the Egyptian sultan decided to destroy the city and rebuild it some kilometers inland, and as a result, of the city dwindled in size.

ultimately stem from the concentration of power in the hands of a small cadre of agents living in the capital.”²⁶

Also, cities with a prominent position in the Church hierarchy were larger than other cities, and the more so the more important their status within the church (compare the bishop to the archbishop effect). This was especially so in Europe, where (arch)bishops often did not confine their role to the religious sphere, wielding considerable political power and playing an important role in the local economy (Hohenberg & Lees, 1995). In the Islamic world, this bishop effect was much less pronounced if not nonexistent.²⁷ This is not unexpected given that the (arch)bishop’s

role in the Islamic world was confined to Christian minorities, only rarely playing a part in deciding on worldly matters (Vryonis, 1971). Combined with our finding that being one of Christianity’s or Islam’s most holy cities did not carry significant positive effects, this result confirms the idea that it was mainly the worldly role that (arch)bishops in Europe played that mattered.

We understand that there may be reverse causality problems here, though: cities may have been selected as capital cities or (arch)bishoprics because they were already large for other reasons. However, “rulers often chose not to establish the seat of government in the metropolis for fear of the potential for unrest any large city breeds” (Bairoch, 1988, p. 155). In many cases the capital city was deliberately established outside the existing urban system (Harris & Ullman, 1945). In fact, our data indicate that generally it was not the already large cities that became a

²⁶ Based on our results, we cannot identify the exact mechanisms driving the capital city effect. These are not unlikely to have been different in Europe from those in the Islamic world.

²⁷ The significant bishop effect in the Islamic world disappears when using a fixed-effects specification; see table A4 in appendix A.

capital or bishopric.²⁸ Many examples exist of relatively unimportant small cities that owed their rise to the fact that they were chosen as capital city—Vienna, Naples, Berlin, Turin, Brussels, and Helsinki in Europe, and Baghdad, Fez, Damascus, or Marrakech in the Islamic world. Also, many examples exist of cities that fell into immediate decline following the loss of their capital or ecclesiastical status—Toledo, Krakow, Avignon, and Bursa, for example.

Next, we turn to the educational institutions in a city. We find a positive effect of hosting a university on urban development in Europe (see also Cantoni & Yuchtman, 2010). We do not find such a result in the three cities in the Islamic world that we classified as having a university: Baghdad, Fez, and Cairo. Also, in the Islamic world, we do not find convincing evidence that having a madrasa carried important benefits to a city's development.²⁹ This latter finding is partly due to the fact that it is difficult to distinguish among different types of madrasas based on the available sources. Our variable captures madrasas ranging from the large university-like institutions in Fez or Baghdad to much smaller-scale religious schools in other cities.

We do not want to stress these university and madrasa findings too much. We are more worried than in case of our bishop and capital city variables that they are plagued by reverse-causality issues. As Bairoch (1988) noted, "The universities . . . gravitated mainly toward cities of more substantial size (p. 165)" and "they rarely constituted poles of urban growth themselves" (p. 190). And although some counterexamples exist (Bologna, Louvain, and Oxford), this statement is confirmed in our data: cities in which a university was established were significantly (p -value: 0.03) larger than cities that did not obtain this institution (39,510 versus 27,070 inhabitants). Similarly, madrasas were most often founded in larger cities. Conditional not having a madrasa, cities obtaining a madrasa were significantly larger than those that did not (51,800 versus 28,360 inhabitants; p -value: 0.03).

Cities' Interaction across and within Religious Lines. Finally, we turn to the evidence for any interdependence between urban developments in Europe and the Islamic world. Remarkably, we found only a positive correlation of urban developments within religious lines. Muslim

cities benefited from urban development in (nearby) Muslim cities, and the correlation among Christian cities was also positive and significant. On the contrary, the correlation in urban development across religious lines was always insignificant.

The additional results in columns 4 to 7 of table 1 strengthen the notion that only interaction within religious boundaries left a positive effect on a city's size. In columns 4 and 5, we use a geographical definition of Europe and the Middle East and North Africa (see figure 1) to split our sample instead of using religion-based boundaries. Whereas most of our other results are similar to those in our baseline, those on our urban potential variables are not: Muslim urban potential lost its significance in the Middle East and North Africa sample, whereas it gained significance in the European sample. However, columns 6 and 7 show that our baseline results reappear when focusing on the Muslim cities in the Middle East and North Africa and on the Christian cities in the European sample, respectively. The Christian cities in the Middle East and North Africa did not experience a significant positive effect of nearby Muslim urban development, turning the Muslim urban potential insignificant in column 4. Similarly, the Muslim cities in Europe did experience a significant positive effect of nearby Muslim urban development, turning the Muslim urban potential significant in column 5.³⁰

We take these findings as tentative evidence that Muslim and Christian cities formed largely separate urban systems that either did not significantly interact with each other or, put differently, any positive interaction resulting from the exchange of goods, people, or ideas was mitigated by other negative interaction between the two.

How plausible is this finding? First, scholars have pointed out that Muslim commercial interests were much more oriented toward Persia, India, and Africa than toward Europe (Bairoch, 1988).³¹ The Muslim Mediterranean trade "primarily connected Egypt and the Levant with Muslim North Africa, Sicily, and Andalusia, and to some extent with Byzantium, rather than with the Christian West" (Pryor, 1988, 137). This is also borne out by the virtual absence of accounts of Arab travelers (for example, Ibn Battuta, Ibn Jubayr, or Al Muqaddasi) visiting Christian Europe, despite the fact that they did travel from Andalusia to East Africa, India, and even as far as China (Paule, 1995). Trade between Muslim and Christian cities did exist, but it was much smaller than trade between cities of similar religious orientation (see Greif, 2006; also, Guiso, Sapienza, & Zinales, 2009, and Helpman, Melitz, & Rubinstein, 2008, provide more

²⁸ Cities gaining capital status are not significantly larger than cities not becoming a capital city: conditional on not being a capital city in century $t - 1$. The population sizes of cities that do become a capital city in century t are 24,620 and 34,240 in our Christian and our Muslim samples respectively. This is not significantly different (p -values: 0.104 and 0.29) from the population size of cities that do not become a capital city in century t : 20,800 and 28,010, respectively. Similarly, cities gaining bishop status are initially not statistically different in size (and even smaller) from cities not gaining bishop status (p -values: 0.34 and 0.28). Only in the case of archbishoprics does the evidence indicate that reverse causality may be an issue: cities in our Christian sample cities that do gain archbishop status were initially significantly larger (more than twice as large: 22,550 versus 50,570 inhabitants) than cities not gaining archbishop status (p -value 0.03).

²⁹ The effect found in column 1 turns insignificant when allowing for city-specific fixed effects; see table A4.

³⁰ Moreover, the results in column 6 show that our Muslim urban potential results in column 2 were not entirely driven by the cities in Andalusia. In table A4 we show that our findings also hold up to exclusively focusing on the countries in the Mediterranean basin. Among others, they show that it is not the developments in north western Europe that are driving our findings in the Christian sample.

³¹ Europe appears to have had a keener interest in the Muslim world, adopting several Arab technologies, such as the use of paper, the Arabic numerals, and the windmill (Watt, 1972, Crespi, 1986).

recent empirical evidence on the difficulty of economic exchange across cultural or religious lines).³² Although Venice and Amalfi may immediately come to mind as counterexamples trading intensively with the Muslim world, these cities were the exception rather than the rule.³³

Additionally, more direct (violent) interactions across religious lines may be behind our findings. In fact, results in table A5 in appendix A that verify the robustness of our findings with respect to using different proxies than our urban potential variables (for example, distance to the nearest Muslim or Christian city or dummy variables indicating the presence, number, or size of other Muslim or Christian cities within a certain distance from a city), suggest that the cities in border areas in particular are driving our findings.³⁴ Urban potential, not distinguished by religion, is significantly positively correlated to city development in both regions, but cities in border areas (Christian cities close to Muslim cities or vice versa) were smaller than others.

The latter strongly points to the idea that Muslim and Christian cities were crowding out each other in border regions. An important reason for this is that these regions were frequent conflict zones (see also Iyigun, 2008, or Fletcher & Iyigun, 2010). The Christian drive to oust the Muslim infidel from their own lands and the Holy Land, combined with the Muslim concept of jihad, exemplified by the religious zeal of the Almohads or the early Ottomans' Gaza ideology (Kafadar, 1996), fueled these conflicts. Note, however, that war and invasion do not appear to be the whole story. Our findings on urban potential are present despite controlling directly for the effect of being plundered.³⁵

³² Constantinople offers an interesting case in this respect: it faced serious food supply problems as grain exports from Egypt, its most important supplier, ceased almost immediately after Egypt was conquered by the Arabs (Teall, 1959). It was not until the Ottoman conquest of Constantinople in 1453 that Egyptian grain again became an important source of food for the city. See also Söderberg (2006), who shows relatively strong integration of grain markets within Western Europe but no integration between Muslim and European markets.

³³ Genoa and Pisa, the two other maritime republics, were in constant conflict with Muslim forces, ousting them from Sardinia and Corsica, and even establishing colonies in North Africa and the Middle East. Also, Venice's decline was partly the result of its unsuccessful campaigns against the rising Ottoman Empire.

³⁴ When restricting our Christian and Muslim samples to only cities within 250 kilometers of a city of the other religious orientation, we also find a negative correlation between the development of Muslim and Christian cities. The positive correlation between cities of similar religious orientation also comes through. However, given the substantially reduced sample sizes, these results are not significant. They are available on request.

³⁵ We do not find convincing evidence that plundered cities are significantly suffering from this. Although the plunder variable is significant in some columns of table 1, this never holds up to also allowing for city-specific fixed effects (table A4). On the one hand, this may be explained by the fact that the 100 years between observations gave many cities the chance to recuperate from such an event. It may also be to some extent explained by issues with reverse causality: for example, the larger cities being particularly interesting to capture and plunder, or, vice versa the smaller cities being easier targets. Also, being located closer to a city of a different religion did not increase a city's chances of being plundered compared to being located closer to a city of a similar religious denomination. However, cities that switched between Muslim or Christian sides had an 8 percentage point higher probability of being plundered. These results, based on a simple fixed effects regression, are available on request.

Another reason for border areas to be less conducive to urban development is that both Christians and Muslims were, on religious grounds, not allowed to enslave their brothers in faith (Fynn Paul, 2009). As a result, the demand for slaves was met by raiding others, particularly affecting those close to the border between the two religions. The Ottomans recruited a large percentage of their slaves from the Balkans (Erdem, 1996). In Iberia and Italy, whole stretches of coastline were abandoned by their inhabitants afraid of being enslaved or held for ransom by Muslim corsairs (Friedman, 1983; Ambrus & Chaney, 2010).³⁶ Vice versa, the French and Spanish attacked or even captured North African towns to free captives and prevent further attacks (Weiss, 2011).

Summary of Baseline Results. Our baseline results point to two important differences between Europe and the Islamic world in the main drivers of urban development. First, the dominant mode of transport, important for a city's opportunities to engage in long-distance trade, differed substantially between the two regions: in Europe this was water based (the ship), whereas in the Islamic world, it was land based (the camel). Second, the difference in main religious denomination in the two regions (Muslim versus Christian) appears to be responsible for a lack of correlation between urban developments in the two regions. On the one hand, the cultural, religious, and institutional differences between the two regions were much bigger than within each region; on the other hand, any benefits of the exchange of goods, people, or ideas across religious boundaries that were present were mitigated by the negative effects of war, slave trade, and piracy (particularly affecting urban development in the border regions between the two religions).

However, our baseline findings also point to much similarity between the two regions. In both Europe and the Islamic world, cities with good access to the important transport corridors and those having an important institutional role were larger than other cities. Moreover, and contrary to our findings regarding the presence of interaction across religious boundaries, we do find evidence for positive interaction between cities of similar religious denomination in both regions.

We are not yet in a position to offer conclusive explanations of the very different long-term urban developments in Europe and the Islamic world. In the next section, we therefore further refine our baseline results. In particular, we look at whether the effects of being located on the major

³⁶ In total, an estimated 1 million to 2.5 million Europeans were captured by the Barbary pirates between the sixteenth and nineteenth centuries alone (Davis, 2003). At times, these slave raids extended deep into each other's territory. Rome was sacked by Muslim forces in 846. In 972, Muslim raiders captured the abbot of Cluny, one of the grandest monasteries of that time, while crossing the St. Bernard Pass in the middle of the French Alps, releasing him only when a large ransom was paid (Brett, 2001). Even the south coast of England was raided several times, and Muslim pirates reached as far as Iceland on one occasion.

transport corridors, the capital city effect, and the interaction of urban development (within and across religious boundaries) vary over the centuries. This will reveal a very different development in the importance of these variables in Europe and the Islamic world, helping us to much better understand their reversal of fortunes.

C. *Century-Specific Impact of Transport Modes, Capital Status, and Cities' Interaction*

In this section, we refine equation (2) and estimate

$$\ln pop_{it} = X_i^* \beta_t + X_{it}^* \gamma_t + X_{it} \gamma + \alpha_i + \alpha_t + \varepsilon_{it}, \quad (3)$$

where X_i^* and X_{it}^* denote the time-invariant and time-varying variables that we allow to have a possibly century-varying effect (β_t and γ_t , respectively), X_{it} are the other time-varying variables, α_i are city-specific fixed effects (absorbing the effect of our other time-invariant variables), and α_t are century fixed effects.

Given the difference in main transport mode between Europe and the Islamic world (water versus land), the geography variables that we allow to have a century-specific effect are location at sea and at a river in our Christian sample and location on a Roman road or a caravan hub in the Muslim sample. Moreover, we allow the same three time-varying variables to have a possibly century-specific effect in both samples: a city's capital city status and its Muslim and Christian urban potential. Allowing for century-specific effects in any of the other included variables generally results in nonsignificant patterns over time.³⁷

Table 2 and shows the results for the Muslim and Christian samples, respectively. Note that the estimated coefficients on our geography variables do not represent the absolute effect of each of these time-invariant variables on city size. Instead, they show the relative effect of each of these variables compared to its unknown effect in 800 (which is absorbed by the city-specific fixed effects).³⁸ For comparison, we therefore also explicitly indicate for each time-varying variable whether its effect in each century is significantly different from that in 800 (see the notes to table 2). The results point to a number of important changes in both Europe and the Islamic world.

³⁷ Results available on request.

³⁸ To aid interpretation, we sometimes refer to the results in tables A7a and A7b in the appendix that show the results of our time-varying regressions when not including city-specific effects. They are useful to get an idea of the absolute size of the time-varying effect of location at sea, river, Roman road, or caravan hub. We also note that in principle, the sea variable does not drop out in 800 in table 2B. However, including this "sea 800" dummy in the regression makes all results heavily dependent on the only two cities in our Christian sample whose direct access to the sea silted up (Seville and Bruges); that is, we can identify a "sea effect" for each individual century by only virtue of these two cities that make our sea variable time varying. Results only become stronger when not excluding the 800 sea effect (they are available on request).

Geography. In the Islamic world, we do not find a significant change in the positive effect of being located on a hub of caravan routes. Being a caravan hub carried the same important benefits throughout our sample period (see also table A7a in appendix A). It concurred with the notion that there were no major efficiency improvements in caravan transport. Such improvements are indeed hard to imagine. A fully loaded camel could travel as far (about 30 miles a day) and carry as much in 800 as in 1800. Moreover, the network of possible routes was largely fixed by the supply of freshwater sources, ruling out any significant improvements in the network of trade routes. Austen (1990) indicates that traveling times of caravans through the Sahara hardly changed over a period of one thousand years (850–1930).

Although not changing in efficiency over time, the caravan trade was more efficient in the Islamic world than trade by horse, oxen, or wheeled cart. There was no need for road maintenance, and camels outperform horses and oxen when it comes to stamina in desert-type conditions (Bulliet, 1975). This clearly shows in our time-varying estimates of the effect of being located on a former Roman road. They show an increasing significantly negative effect over the centuries (again see also table A7a in appendix A). It confirms the substantial change in the dominant transport mode following the Arab conquests: camels took over the role of horse- and oxen-drawn carts (see also Hourani, 2002).

The time-varying results for Europe in table 2B stand in sharp contrast to this largely unchanging importance of location on the main transport corridors in the Islamic world. In particular, we find a significantly increasing positive effect of being located at sea over time.³⁹ Europe's focus on water-based, and in particular seaborne, trade proved very beneficial in the longterm given the much bigger scope for productivity gains due to technological innovations in shipbuilding, sailing techniques, and improved navigation (eventually resulting in finding the direct route to Asia and the discovery of the Americas). We do not find a similar pattern in river transport where the improvements in sailing techniques and navigation technology (see Unger, 1980, 1998) had much smaller impacts, for example, transportation upriver often depended on horse- or manpower—towing boats along towpaths.

Institutions. A second important difference between the two regions is the evolution in the magnitude of the capital city effect over the centuries. The estimated capital city coefficient in the Islamic world does not show a significant pattern over the centuries (we cannot reject the equality of all the century-specific capital city effects as well as the

³⁹ Although we reject that the 900–1800 results are jointly significantly different from the sea effect in 800, the sea effect is significantly different from that in 800 in 1700 and 1800. Moreover table A7b shows that from about the sixteenth century onward a significantly positive sea effect starts to appear when not controlling for city-specific fixed effects.

TABLE 2.—TRANSPORT, CAPITAL STATUS, AND UP OVER TIME, THE ISLAMIC WORLD AND EUROPE

| A. Muslim | | | | | |
|---|------------|-------------|----------------------|-------------------------|----------------------------|
| Year | Roman Road | Caravan Hub | Capital | Urban Potential, Muslim | Urban Potential, Christian |
| 800 | — | — | 0.19 | 0.9*** | −1.04* |
| 900 | −0.39 | 0.12 | 0.50 | 0.81*** | −0.84* |
| 1000 | −0.57* | −0.15 | 0.41 | 0.45*** ^a | −0.51 |
| 1100 | −0.64 | −0.28 | 0.4*** | 0.26 ^a | −0.40 |
| 1200 | −0.62 | −0.19 | 0.48*** | 0.12 ^a | −0.04 ^b |
| 1300 | −0.99* | −0.25 | 0.47*** | 0.19 ^a | 0.21 ^b |
| 1400 | −1.15* | −0.22 | 0.45** | 0.32* ^a | 0.38 ^b |
| 1500 | −1.15* | −0.26 | 0.61*** | 0.10 ^a | 0.14 ^b |
| 1600 | −0.75 | −0.43 | 0.63** | 0.08 ^a | 0.30 ^b |
| 1700 | −0.64 | −0.38 | 0.82*** | −0.04 ^a | 0.04 ^b |
| 1800 | −0.89 | −0.36 | 0.64* | 0.11 ^a | −0.14 ^c |
| <i>p</i> -value <i>F</i> -test: Same effect over the centuries? | | | | | |
| | [0.17] | [0.24] | [0.36] | [0.00] | [0.03] |
| Other variables (see baseline) | | | | | |
| Observations: 656 | | | | | |
| B. Christian | | | | | |
| Year | Sea | River | Capital | Urban Potential, Muslim | Urban Potential, Christian |
| 800 | — | — | 0.91*** | −0.19 | 0.26 |
| 900 | 0.14 | −0.25 | 0.01 ^b | −0.14 | 0.45** |
| 1000 | 0.09 | −0.17 | −0.09 ^a | 0.29 | −0.03 |
| 1100 | 0.02 | −0.01 | 0.07 ^a | 0.17 | 0.32* |
| 1200 | −0.03 | −0.04 | 0.10 ^a | −0.03 | 0.40** |
| 1300 | 0.12 | −0.08 | 0.38*** ^a | 0.19 | 0.69*** ^b |
| 1400 | 0.02 | −0.09 | 0.44*** ^b | 0.06 | 0.52*** |
| 1500 | 0.11 | −0.03 | 0.48*** ^b | 0.31 | 0.64*** ^c |
| 1600 | 0.27 | 0.01 | 0.75*** | 0.08 | 0.66*** |
| 1700 | 0.38** | −0.01 | 1.13*** | 0.14 | 0.71*** ^c |
| 1800 | 0.45** | 0.07 | 1.31*** ^c | −0.05 | 0.50** |
| <i>p</i> -value <i>F</i> -test: same effect over the centuries? | | | | | |
| | [0.29] | [0.82] | [0.00] | [0.11] | [0.00] |
| Other variables (see baseline) | | | | | |
| Observations: 1,940 | | | | | |

The dependent variable in all columns is $\ln(\text{city population})$. Significant at *10%, **5%, and ***1%, respectively, and, for the three time-varying variables only, the superscript c, b, a denote significantly different from its effect in 800 at 10%, 5%, 1%, respectively (both based on standard errors that are clustered at the individual city level). The coefficients on the geography variables directly reflect its effect relative to that in 800 (see table A7a in appendix A for the results without city-specific FE, showing the absolute effect of each geography variable by century yet under the assumption of no city-specific FE). The regression also includes a full set of century dummies.

individual equality of each century-specific effect to that in 800). It was large during the flowering of the early Islamic caliphates and showed only a slight increase with the rise of Istanbul as the capital of the Ottoman Empire. Capital cities dominated the urban landscape, and despite substantial changes in the political map of the Islamic world, the extent of their dominance did not significantly change over the 800–1800 period.

In contrast, we do find significant changes in the dominance of capital cities in Europe (we reject that the capital city effect is equal over the centuries). With the exception of 800, when the positive capital city effect is a last reflection of the importance of Rome and Constantinople as the former capitals of the western and eastern (by then Byzantine) Roman Empire, we do not find a significant capital city effect in Europe at the beginning of our sample period. The estimated coefficient does, however, show a steady increase from 900 onwards, and from about the thirteenth century, we start observing a significant capital city effect. However, only from about 1600 onward did the capital

cities dominate the European urban landscape to a similar, or even larger, extent as in the Islamic world.⁴⁰ This increasing dominance of capital cities clearly reflects the (slow) process of state formation in Europe (Tilly, 1990). After the collapse of the Carolingian empire, Europe was politically heavily fragmented, resulting in a complex patchwork of political entities, with many new capital cities founded or formed out of initially small towns. Eventually the successful regional or city-states were able to consolidate ever larger territories, resulting in the formation of new and strong territorial states (France, Spain, England) with large, centralized governments principally located in their capital city.

Cities' Interaction across and within Religious Lines. Finally, we turn to the correlation between urban develop-

⁴⁰ Or to the same extent as Rome and Constantinople did as (former) capitals of the Roman Empire (see the results of testing for the equality of each century-specific capital city effect to that in 800).

ments across religious lines. Confirming results in table 1, we generally found no significant correlation between the development of cities of different religious denomination throughout our sample period. Only in the earlier centuries of our sample did we find some weak evidence that Muslim cities located close(r) to Christian cities were significantly smaller.⁴¹

On the contrary, the century-specific results regarding the interaction within religious boundaries showed a very interesting evolution over the centuries and a very different one in Europe compared to the Islamic world.

In the Islamic world, we found only significant positive correlation between the development of Muslim cities until about the tenth century. Interestingly, this period coincides with the golden age of Islam. It encompasses the heyday of the early Islamic caliphates that ruled from present-day Spain to Iran. The caliphates maintained law and order and imposed similar institutions for exchange. Moreover, from Córdoba to Baghdad, the ruling class spoke one language, the region was both culturally and religiously very homogeneous, connected through the efficient caravan network, and there existed few barriers to trade (see Findlay & O'Rourke, 2007; Bairoch, 1988, even speaks of a "vast Islamic free-trade zone").⁴²

Things changed significantly from the eleventh century onward, when the significantly positive Muslim interaction effect disappeared. The immediate cause appeared to be the demise of the early Islamic caliphates that started to crumble due to internal struggles and resulted in a period of increasing political fragmentation.⁴³ Besides that, and partly as a result of these internal struggles, Islam was for the first time in centuries on the defense. Christian forces captured Sicily in 1091, in 1095 Pope Urban II launched the First Crusade, and on the Iberian peninsula, the Christian Reconquista started to gain momentum. Finally, the Mongol incursions in the thirteenth century dealt a decisive blow to the Abbasid caliphate, destroying Baghdad in 1258. These internal and external struggles severely harmed the integrated urban system, resulting in the loss of the positive interaction between cities.

Eventually the Ottomans would reestablish an empire covering most of the Middle East and North Africa. However, the Ottoman empire was focused toward economic development of its Anatolian homelands, and its Turkish lan-

guage and culture differed significantly from its conquered North African and Middle Eastern provinces and vassal states. The main purpose of these provinces was resource and tax extraction, and independent development in these provinces was often viewed as a threat to Ottoman rule and deliberately discouraged (for more detailed expositions of the economic and institutional developments in the Ottoman empire), see Pamuk, 2004, 2008; Hourani, 2002; Inalcik, 1994). As a result, urban development was concentrated in a few cities only—the successive Ottoman capital cities Bursa, Edirne, and Istanbul, in particular, (Inalcik, 1970), and we do not observe a return to the positive feedbacks between cities as experienced during the golden age of Islam.⁴⁴

In Europe we observe the exact opposite: no evidence for significant positive interaction effects between cities until the twelfth century.⁴⁵ The European economy stagnated in the early Middle Ages, resulting in sharply declining trade volumes (Pirenne, 1969; McCormick, 2001). The disintegration of the Carolingian Empire resulted in a complex patchwork of small political entities that were developing their own institutions, knew many different languages, and had different systems of common law. Yet in spite of this substantial political, cultural, and linguistic fragmentation, trade in Europe witnessed a revival after about 1000 (Davis, 1955; Bairoch, 1988), and we see the emergence of particular institutions such as guilds or communes that governed (long-distance) exchange (Greif, 2006; van Zanden, 2008).⁴⁶ It may therefore not be surprising that we find an integrated urban system appearing from about the twelfth century onwards.⁴⁷ Interestingly, the later rise of the nation-states did not, despite the increased dominance of capital cities in the urban landscape, diminish the "relatively high degree of interactions between cities . . . in late preindustrial Europe" (Duranton, 1999). In fact, many European states adopted mercantilist policies, actively stimulating exports and building up a trading empire (Epstein, 2000; Hohenberg & Lees, 1995).

⁴⁴ Indeed, before the rise of the Ottoman Empire, the largest cities in the Islamic world can be found from Baghdad to Cairo, to Marrakech, to Córdoba. Following the rise of the Ottoman Empire, however, more and more of the largest cities can be found close to the main center of Ottoman power in western Anatolia (Edirne, Bursa, Saloniki, Izmir, and, of course, Istanbul).

⁴⁵ The significantly positive effect of Christian urban potential in 900 was driven by London and Porto, two very small cities at the time, located on Europe's periphery (plagued by Viking raids; in fact including only an "Atlantic location dummy for the pre-1000 period" turns this finding insignificant).

⁴⁶ Pirenne (1969, p. 129) remarks that the eleventh-century fairs in France that brought together merchants from the north and the south of Europe saw "from the very first the elaboration of a sort of commercial jurisprudence, the same everywhere despite the differences in country, language, and national laws."

⁴⁷ Note that we cannot always reject the equality of each individual post-1100 century-specific effect of Christian urban potential and its effect in 800. However, we always do reject equality of each individual post-1100 century-specific effect of Christian urban potential and its effect in 1000. Moreover, we reject the overall equality of all century-specific effects of Christian urban potential (see the *p*-value of the *F*-test reported in table 2B).

⁴¹ This effect is also significantly different from the nonsignificant correlation between Christian urban potential and Muslim city development in the later centuries.

⁴² Language, cultural, and institutional similarity still play an important role in determining trade costs in the modern empirical international trade literature (Anderson & van Wincoop, 2004).

⁴³ The Fatimid caliphate disintegrated under pressure of the Almoravids, Berbers, Crusaders, and Turks to finally encompass only Egypt before Saladin dissolved it in 1171. The Abbasids increasingly lost control of their vassal states (to, for example, the Tulunids or Aghlabids) and of their Persian provinces (to the Buyids and later Ghaznavids). The Umayyad rule in Andalusia was under threat from both Christian (from the north) and Berber (from the south) forces; it finally dissolved into independent *taifa* kingdoms in the early eleventh century.

Summary of Time-Varying Results. Our time-varying results significantly modify our baseline findings in section 4.2.

First, although the Islamic world was initially very innovative in adopting a superior mode of land-based transportation (replacing horse or oxen-drawn carts by the camel), in the long term, the absence of opportunities for efficiency improvements in the caravan trade constituted a stark difference with Europe. The European focus on water-based trade, combined with the much bigger scope for technological innovation in ship design, sailing, and navigation techniques, and in establishing more efficient networks of shipping routes (van Zanden & van Tielhof, 2009) eventually gave the Europeans the upper hand in long-distance trade. Culminating in the great discoveries that gave Europe not only direct access to Asia's markets (diminishing the importance of the Islamic world's role as middleman in the trade between Europe and Asia), but also resulting in an inflow of wealth and resources from the newly discovered Americas (Findlay & O'Rourke, 2007; Steengaard, 1974).

Second, the state appears to have played a more consistent dominant role in the Islamic world. Capital cities dominated the urban landscape in the Islamic world throughout our sample period. In Europe, this was not the case. From the thirteenth century onward, with the slow rise of the nation-state, we do start to observe an increasing dominance of capital cities. But only from about 1600 onward did the capital city dominate the European urban landscape to the same extent as in the Islamic world.

Finally, although our time-varying results do not significantly modify our baseline findings regarding the lack of interaction across religious lines, the correlation between the development of cities of similar religious denomination shows significant differences over the centuries in both regions. In the Islamic world, we find evidence of significant positive interaction between cities during the golden age of Islam only. Following the disintegration of the early Islamic caliphates, the development of cities in the Islamic world lost their interdependence. Moreover, the eventual rise of the Ottoman empire did not result in a return to the integrated urban system in place during the golden age of Islam. In Europe we observe a completely different picture. There the urban system started to show signs of positive interaction between cities from about the twelfth century onward. This happened in a period of weak states and political fragmentation and despite differences in language, culture, and institutions, and it survived the rise of the European nation-states and the increased dominance of capital cities in the urban landscape.

In the next section we explore this latter finding and show that the different institutional developments in the two regions are very important for understanding why a more interdependent urban system started to evolve in Europe in a period of fragmentation, whereas we do not observe such a development in the Islamic world.

D. Local Authority: A Defining Difference between Europe and the Islamic World?

Work by Acemoglu et al. (2005), DeLong and Shleifer (1993), Guiso et al. (2008), and Jacob (2010) already points to an important positive effect of the quality of political institutions on urban development.⁴⁸ The greater the degree of local authority and the fewer the constraints on economic activity imposed by the state, the better the incentives and opportunities are for economic and urban expansion.

We build on these papers and introduce two city-specific variables. The first, our *commune* variable, provides information on the degree of local participative government. The other, our *active parliament* variable, indicates whether the city had the possibility of influencing statewide policy through the existence of an active national parliament comprising not only members of the nobility and the church but, importantly, also representatives of the cities.

Forms of local participative government start to evolve during the period following the collapse of the Carolingian Empire when Europe was politically fragmented. In the power vacuum that resulted, cities could organize themselves and claim a kind of self-rule that was often acknowledged by the sovereign in return for taxes or loyalty (Jones, 2003). The first occurrences of communal self-government showed up in the eleventh and twelfth centuries in Spain and Italy, spreading over the rest of Europe in the following centuries (in 1800, about 53% of our European cities had some form of local authority). The result of these forms of local participative government was that citizens could better protect their property against predating local lords, regulate their own systems of justice, and introduce laws beneficial to industry and trade (Weber, 1922, 1958).

As these cities gained in power and influence, they also started to ask for influence in national decision making, and tax policy in particular. This eventually resulted in cities' gaining representation in royal assemblies that developed into national parliaments (see van Zanden et al., 2012, for a more detailed account of the rise (and fall) of the parliament in Europe). It may therefore be no coincidence that the emergence of parliaments followed that of local participative government by about a century: the first parliaments convened in twelfth and thirteenth-century Spain, Italy, and France, spreading over the rest of Europe in the following centuries.

This development stands in sharp contrast to that in the Islamic world. There, a process of cities acquiring forms of local participative government never took hold. Although there is some discussion on the emergence of feudal institutions in the Islamic world as well, they lacked the important dimension of fragmented sovereignty that is characteristic for Europe in the Middle Ages (see the discussions in Ash-tor, 1976, and Inalcik, 1994). In the Islamic world, given the

⁴⁸ The former two papers focus on urbanization or city size as indicators of urban development and are thus more directly related to this paper. The latter two papers have a different scope, showing the importance of city-specific institutions for the accumulation of social capital.

dominant role played by the elite ruling class, “true urban autonomies would have been unthinkable” (Cahen, 1970 p. 520; see also Fritschy, 2009).⁴⁹ Cities in the Ottoman Empire were governed in a decentralized way; however, the main urban official (*kadi*) was always appointed by the state and in charge of executing state policies (see Ergene, 2003).

To establish empirically whether having a form of local participative government or parliamentary representation is beneficial to a city’s development, we add our commune- and active-parliament variables to our baseline regressions. Additionally, and as a way of contrasting these developments to those in the Islamic world, we also include our large-state variable to the regression. The extent of empire was larger in the Islamic world throughout our sample period (more cities are part of large states than in Europe; see table A1). Given that larger states tend to be more powerful and have more resources at their disposal, including this variable allows us to verify whether this affected city development for better (safeguard trade routes, maintain law and order) or for worse (heavy taxation, controlling migration, for example, the forced migration policies of the Ottoman Empire; see Acun, 2002).

In addition to looking for a direct effect of these three variables, we also include them interacted with our two urban potential variables. This allows us to verify, for example, whether the emergence of the more independent European cities contributed to the interdependent European urban system that started to appear from about the same time as we witness the first signs of local participative government or parliamentary representation, or, alternatively, whether it was mostly the rise of the large European nation-states that explains this pattern.

Table 3 shows the results. Given that our three institutional variables of interest do vary over time, we, as in tables 2, include city-specific fixed effects in all regressions. Moreover, we also include an extended version of DeLong and Shleifer’s (1993) country-specific *free-prince* variable in each of the regressions for comparison to DeLong and Shleifer (1993) and Acemoglu et al. (2005) that look at the relevance of country-specific institutions for European city development.⁵⁰

Column 2 shows that local participative government and parliamentary representation both carried significant direct positive benefits for city development in Europe. The added variance in the (evolution of) institutional quality between

cities in the same country allows us to identify these effects when including city-specific fixed effects (in contrast to the country-specific *free-prince* variable that loses its significance)⁵¹. Moreover, column 4 shows that it may be no coincidence that we see the emergence of a more interdependent urban system in Europe during the same period that cities started to obtain forms of local participative government. Cities with a form of local participative government benefited to a significantly larger extent from urban development in their vicinity.⁵² In contrast, we did not find that European cities that were part of a larger state showed a significantly different development from cities that were not, nor did they benefit more or less from urban development in their vicinity. Moreover, our findings are not driven solely by developments in England and the Low Countries (see column 7).

This finding is very different in the Islamic world. There (see column 1), cities part of a large state were significantly larger (a finding that is not driven by the capital cities only).⁵³ Furthermore, column 3 shows that only cities part of the larger states were significantly benefiting from urban development in their proximity (see also the *p*-value at the bottom of table 3). Note that column 3 also suggests some evidence for a significantly positive effect of Christian urban potential for cities in the Islamic world, but only those that were not part of the larger states (the *p*-value of testing for the significance of Christian urban potential in large states is 0.21). Column 5, however, shows that this finding can be totally attributed to the three main cities—Granada, Malaga, and Almeria—in the Emirate of Granada (1238–1492). Leaving out these three cities in the thirteenth and fourteenth centuries (dropping only six observations) turns this result insignificant, while all our other results come through.⁵⁴

⁵¹ As in case of our other city-specific institutional variables, one may be worried about reverse causality here. However, similar to our bishop and capital city variables, it is generally not the larger cities that get forms of local participative government. In fact, conditional on not having a form of local participative government in century $t - 1$, cities that do gain this in century t are smaller than cities that do not (20,170 versus 26,080 inhabitants; *p*-value *F*-test significance of difference: 0.08). Similarly, cities without parliamentary representation in century $t - 1$ but that do obtain parliamentary representation in century t have fewer inhabitants than cities that do not (24,460 versus 26,090 inhabitants; *p*-value *F*-test significance of difference: 0.62).

⁵² The marginal effect of having local authority and parliamentary representation and its significance now crucially depend on a city’s urban potential. Figure A2a shows that the effect of having local authority and parliamentary representation is significantly positive for cities with sufficiently large urban potential. A similar argument holds in the case of being part of a large state in the Islamic world (see figure A2b).

⁵³ The interaction term of our large-state and capital city variable is never significant when adding it to the regression (also in the case of our Christian sample).

⁵⁴ A possible explanation for the positive effect of Christian urban potential for these three cities in the Emirate of Granada, is the fact that the emirate formally aligned itself to the Christian Kingdom of Castile in 1238. It basically was a tributary state, paying gold to the Castilian kings in return for peace. It even provided Castile military assistance, most notably in the capture of Seville in 1248.

⁴⁹ It is important to note that we are not considering city independence per se. Following the fall of the Umayyad caliphate in 1031, Andalusia was, for example, divided into many small Muslim emirates (*taifas*) often comprising only one city and its immediate surroundings. These were, however, ruled by a small group of elites (the emir and his court); they did not develop forms of local participative government. Similarly, we consider city-states in Europe only with signs of local participative government (for example excluding hereditary seigneuries). See also our data appendix.

⁵⁰ We extend their *free-prince* variable by classifying the cities in the Middle East and North Africa (regions not considered by DeLong & Shleifer, 1993 as *prince* throughout the sample period).

TABLE 3.—FOCUS ON CITY-SPECIFIC INSTITUTIONS

| | Muslim | Christian | Muslim | Christian | No Emirate Granada, Muslim | Ottomans, Muslim | No UK and Low Countries Christian |
|--|------------------|-------------------|-----------------|-------------------|-------------------------------|---------------------|--------------------------------------|
| ln UP, Muslim | 0.37* [0.06] | 0.17 [0.18] | 0.05 [0.81] | 0.17 [0.26] | 0.02 [0.92] | 0.05 [0.82] | 0.13 [0.4] |
| ln UP, Christian | 0.36 [0.14] | 0.47*** [0.00] | 0.46* [0.06] | 0.46*** [0.00] | 0.37 [0.13] | 0.41* [0.10] | 0.34** [0.03] |
| Commune | — | 0.10* [0.09] | — | −0.21 [0.15] | — | — | −0.20 [0.19] |
| Parliament | — | 0.10** [0.04] | — | −0.01 [0.97] | — | — | 0.09 [0.56] |
| Large state | 0.18** [0.01] | 0.02 [0.60] | 0.10 [0.32] | 0.15 [0.16] | 0.14 [0.18] | 0.07 [0.49] | 0.08 [0.46] |
| Ottoman | — | — | — | — | — | 0.04 [0.78] | — |
| Free-Prince | 0.03 [0.90] | 0.08 [0.15] | 0.02 [0.94] | 0.08 [0.14] | −0.18 [0.30] | 0.04 [0.86] | 0.03 [0.51] |
| ln UP, Muslim Commune | — | — | — | −0.02 [0.85] | — | — | −0.02 [0.86] |
| Parliament | — | — | — | −0.06 [0.52] | — | — | −0.04 [0.71] |
| Large state | — | — | 0.33* [0.07] | 0.09 [0.39] | 0.37** [0.03] | 0.36** [0.05] | 0.14 [0.25] |
| Ottoman | — | — | — | — | — | −0.10 [0.45] | — |
| ln UP, Christian Commune | — | — | — | 0.15** [0.02] | — | — | 0.15** [0.02] |
| Parliament | — | — | — | 0.04 [0.45] | — | — | 0.00 [0.99] |
| Large state | — | — | −0.14 [0.12] | −0.06 [0.26] | −0.13 [0.15] | −0.13 [0.2] | −0.02 [0.7] |
| <i>p</i> -value ln UP sign different from 0 if city has a: | | | UP - Muslim | UP - Christian | UP - Muslim | UP - Christian | |
| Commune | — | — | — | [0.00] | — | — | [0.00] |
| Parliament | — | — | — | [0.00] | — | — | [0.03] |
| Large state | — | — | [0.04] | [0.00] | [0.04] | [0.03] | [0.03] |
| Ottoman | — | — | — | — | — | [0.12] | — |
| Number of observations | 656 | 1,940 | 656 | 1,940 | 650 | 656 | 1,676 |

The dependent variable in all columns is ln(city population), significant at *10%, **5%, and ***1%, respectively (based on standard errors that are clustered at the individual city level). All regressions also include a full set of city and century dummies. The other institutional variables (results not reported are very similar to those in table 2) are dummy variables for bishoprics, archbishoprics, capitals, universities, madrasas, and being plundered. The *p*-values at the bottom of the table correspond to testing whether the effect of urban potential is significantly different from 0 in case a city had local participative government, parliamentary head representation or was part of a large state, respectively. For each sample, they show the results of these tests only for the part of urban potential derived from cities with similar religious denomination. Invariably, the effect of urban potential derived from cities with a different religious denomination is never significantly different from 0. Actually, the parliament variable does not drop out in the Muslim sample. This is solely due to the fact that we classified Buda in 1700 as falling under the influence of the Hungarian parliament, which had met nineteen times during the seventeenth century. However, the Ottomans officially ceded their possessions in Hungary only in January 1699 in the Treaty of Karlowitz, so Buda is classified as a Muslim city in the seventeenth century. UP = Urban Potential.

Finally in column 6 and based on the changing importance of Muslim urban potential that we found in section IVC, we investigated our large state findings in the Islamic world a bit further by distinguishing between the Ottoman Empire (the only Islamic large state in our sample after 1500, with the exception of the Kingdom of Morocco), and the early Islamic caliphates. This shows that our finding that only cities part of larger states significantly benefited from each other's presence was primarily driven by the early Islamic caliphates. This effect was not significantly present in the cities of the Ottoman Empire.

Overall, the findings in Europe regarding the importance of local participative government stand in sharp contrast to the absence of a process of bottom-up institution building in the Islamic world. There, cities did not obtain similar forms of local participative government or representation in state policy during the period of increased political fragmentation following the demise of the early Islamic caliphates. Eventually, in both Europe and the Islamic world, a

period of political fragmentation was followed by the rise of strong nation-states. However, the European cities, by virtue of their newly gained influence in local and national policymaking, managed to withstand predatory actions undertaken, by these newly powerful states much better. Although the rise of the nation-state did result in capital cities, starting to dominate the European urban landscape to a similar extent as in the Islamic world (see table 2), we did not observe a loss of the significantly positive interdependence between European cities or find that cities in these larger European states were different from those that were not. In many regions the capital city was held in check by the other cities in the urban system that continued to be well represented in government affairs through the emergence of active national parliaments or their larger degree of communal self-rule. It may therefore also be no surprise that the center of Europe's urban development shifted to exactly those regions—notably the Netherlands and the United Kingdom, but also Switzerland and Sweden—where, in

contrast to, say, France, Spain, or Germany, cities were able to maintain their local authority or strengthen their position in national representative institutions.

V. Conclusion

This paper sheds new empirical light on the divergent development of Europe and the Islamic world between 800 and 1800. On the basis of a large, newly collected data set of cities in Europe, North Africa, and the Middle East, we provide empirically founded answers to the question why the urban center of gravity moved from the Islamic world to Europe. We draw the following conclusions on the basis of our analysis.

First, the difference in main religious denomination constituted a significant barrier between the two regions. Although there may have been benefits of the exchange of goods, people, or ideas, these were largely undone by the negative consequences of the religious divide between the two regions—either indirectly in posing additional institutional, religious, or cultural boundaries to exchange, or directly in the form of piracy, war, and slave raids, that in particular held back urban development in regions close to the border between Islam and Christianity. As a result, we find that the main reasons for the Islamic world's stagnation and Europe's long-term success are to be found within each region.

The first defining difference between the two regions was their different choice of main transportation mode. The Islamic world was very innovative in replacing horse and oxen-drawn carts by the camel, a much more efficient means of transport in the desert-type conditions found in many parts of North Africa and the Middle East. However, possibilities for efficiency gains in the caravan trade were low, especially compared to those in water-based transportation, the main mode of transport in Europe. Europe's focus on water-based, and in particular seaborne, trade proved very beneficial in the long term given the much bigger gains in productivity due to innovations in shipbuilding and improved sailing and navigation techniques, eventually resulting in the discovery of the Americas and the direct route to Asia.

The difference in institutional developments is the second defining difference between the two regions. Throughout our sample period, capital cities dominated the urban landscape in the Islamic world. In Europe, this was not the case. Following the demise of the Carolingian Empire, Europe for many centuries was, fragmented in many small political entities. During this period, cities started to develop forms of local participative government and to demand representation in national policymaking. This made them less dependent on the state than the cities in the Islamic world, which never developed such forms of participative government. Eventually, with the rise of the European nation-states, we start to observe an increasing importance of capital cities in the European landscape as well. How-

ever, in many regions of Europe the capital city was held in check by the other cities in the urban system that often maintained a degree of local authority and continued to be well represented in government affairs through the emergence of active national parliaments.

Finally, and contrary to the absence of significant interaction across religious lines, we find that cities' development does show significant signs of positive interaction within religious borders. In the Islamic world, we find evidence of such significant positive interaction during the golden age of Islam only. Following the disintegration of the early Islamic caliphates, the development of cities in the Islamic world lost its interdependence. This period of political instability ended with the rise of the Ottoman Empire. However, given its linguistic and cultural differences to the rest of the Islamic world, combined with its frequent imposition of constraints on development in its conquered provinces and vassal states, it did not result in a return to the integrated urban system in place during the golden age of Islam.

Europe offers a completely different picture. In the early Middle Ages, we do not find any signs of an integrated urban system. However, from about the twelfth century onward, we start to see the first signs of positive interaction among cities. Despite differences in language, culture, and institutions, this interdependence emerged in a period of weak states and political fragmentation. The appearance of cities with forms of local participative government played an important role in the creation of this interdependent urban system, as well as in its survival despite the rise of the European nation-states and the increased dominance of capital cities in the urban landscape.

The success of this more state-independent, water-based, trade-oriented, urban system is an important reason that the urban center of gravity shifted from the Islamic world to Europe, making London, instead of Baghdad, the largest, most important city in this part of the world.

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